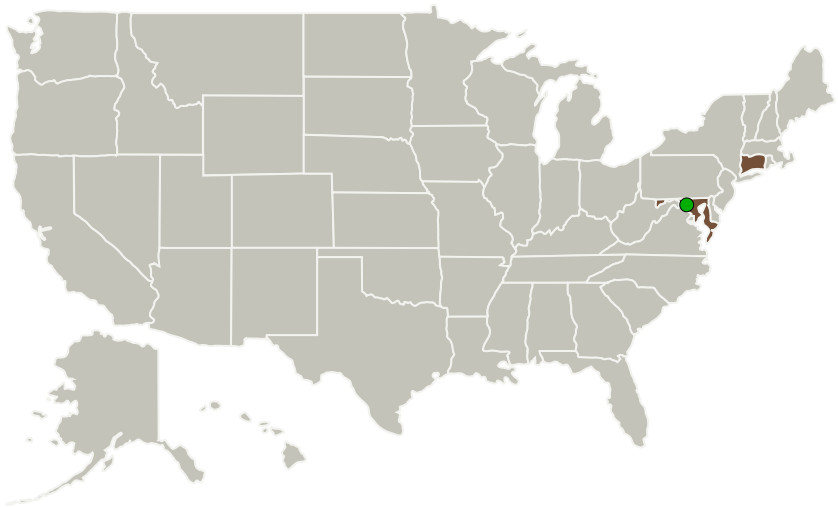
A Light Weight, Mini Inertial Measurement System for Position and Attitude Estimation on Dynamic Platforms, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

Impact Technologies, LLC in collaboration with the Rochester Institute of Technology, proposes to develop an innovative and revolutionary method for a miniature low cost, weight, and power, highly accurate INS system coupled with GPS receivers providing stable and highly accurate positioning, attitude, and inertial measurements while being subjected to highly dynamic maneuvers. In contrast to conventional methods that utilize extensive ground-based real-time tracking and control units that are expensive, large, and require excessive amounts of power to operate, our method focuses on the development of a highly-accurate attitude estimator that makes use of a low cost, miniature accelerometer array fused with traditional measurement systems and GPS. Through the utilization of a position tracking estimation algorithm, on-board accelerometers are numerically integrated and transformed using attitude information to obtain an estimate of position in the inertial frame. Position and velocity estimates are subject to drift due to accelerometer sensor bias and high vibration over time, and therefore require the integration with GPS information using a Kalman filter to provide highly accurate and reliable inertial tracking estimations. The development of such technology is required for the enablement of the proposed highly accurate attitude estimator that is a primary focus of this proposed work.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Connecticut	Maryland

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139982)*

Project Management

Program Director:

Jason L Kessler

Program Manager:

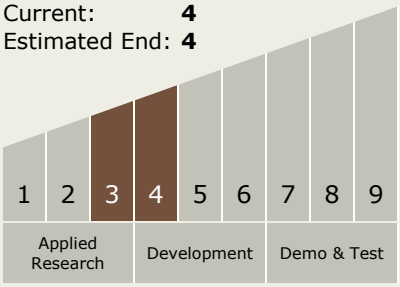
Carlos Torrez

Principal Investigator:

Liang Tang

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.2 Navigation Technologies
    - TX17.2.3 Navigation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System